



# Enterprise neutral host deployments: Real world solutions

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MOBILIZING  
ENTERPRISES &  
COMMUNITIES

# Intro: Crown Castle



## Company

- In the United States
- 40,000+ towers
- 80,000+ route miles (~129,000 km) of fibre
- 900+ connected data centres, PoPs, and colocation
- 47,000 on-net buildings with more than 50 cloud access points
- 115,000 small cells on air or under contract
- ~5,000 employees
- 25+ years owning and operating network assets
- \$91.9b (~ £74.4b) enterprise value

- Since 1994, Crown Castle has worked around the United States to build and maintain the infrastructure behind the world's most revolutionary technologies.
- Our nationwide portfolio of towers, small cells, and fiber connects cities and communities to essential data, technology, and wireless service - bringing information, ideas and innovations to the people and businesses that need them.

# SCF membership benefits to Crown



- What others are doing globally
- Perspectives from
  - telecoms experience
  - manufacturers
  - developers
  - neutral hosts
  - enterprise-focused service providers
  - mobile operators
- Sharing of ideas and pushing the envelope of small cells and technologies to bring value to the telecoms industry



Total spending for outdoor small cell actuals by spectrum (\$ millions), 2020-2025. Source: iGR, 2021

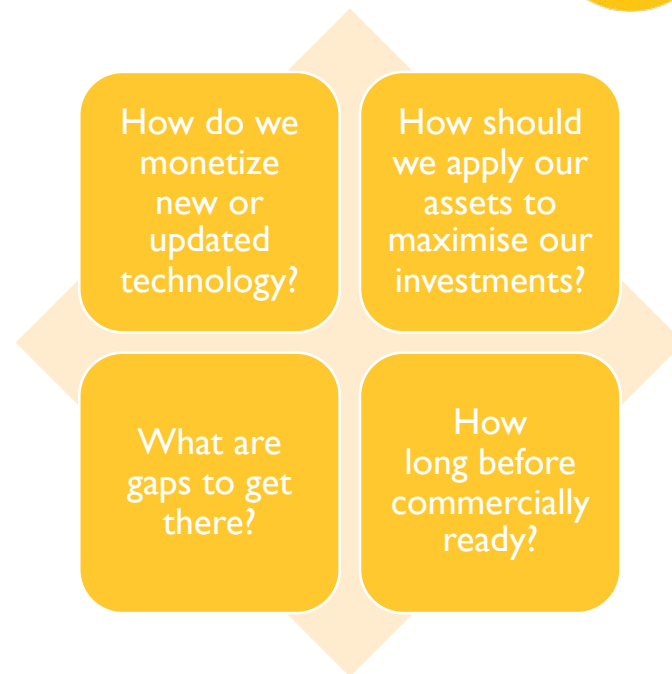
# New Small Cells Business Case - development

We decided we needed a customer-partner with the following characteristics:

- Owns or manages premium properties
- Has strong IT resources and capabilities
- Is curious and willing to trial a private CBRS network
- Is willing to work towards 5G in the future

Our OEM partners needed to be just as progressive:

- Experienced with operators in the United States
- Experienced in private network deployments
- Cost effective solution
- Software upgradeable from 4G to 5G
- Responsive to our neutral host provider needs



# Our customer-partner is very valuable



- Rudin Management company:
  - Rudin is advancing smart building management solutions, improving building intelligence
    - 345 Park Avenue in NYC (44 stories)
  - Rudin's building has high-value tenants
    - NFL hq, KPMG, Blackstone
  - Use case testing and optimisation in the lobby and mezzanine levels
    - Mostly during the COVID 19 pandemic
    - Health and safety protocols
- Operators are interested
  - Need to improve in-building coverage

In 2021, Crown Castle and the Rudin Family announced that 345 Park Avenue has become one of the first multi-tenant commercial office buildings in the United States to enable Citizens Broadband Radio Service (CBRS).

# Drivers for this solution



- Rudin private network
  - Local data security – retain full control of information
  - Building management system to support eco-friendly initiatives
  - Support for tenant use cases
- Operator coverage
  - Extending their 5-bars service into buildings
  - Capacity offload from the outdoor macro network
  - Upper floors typically suffer from poor coverage



# The solution

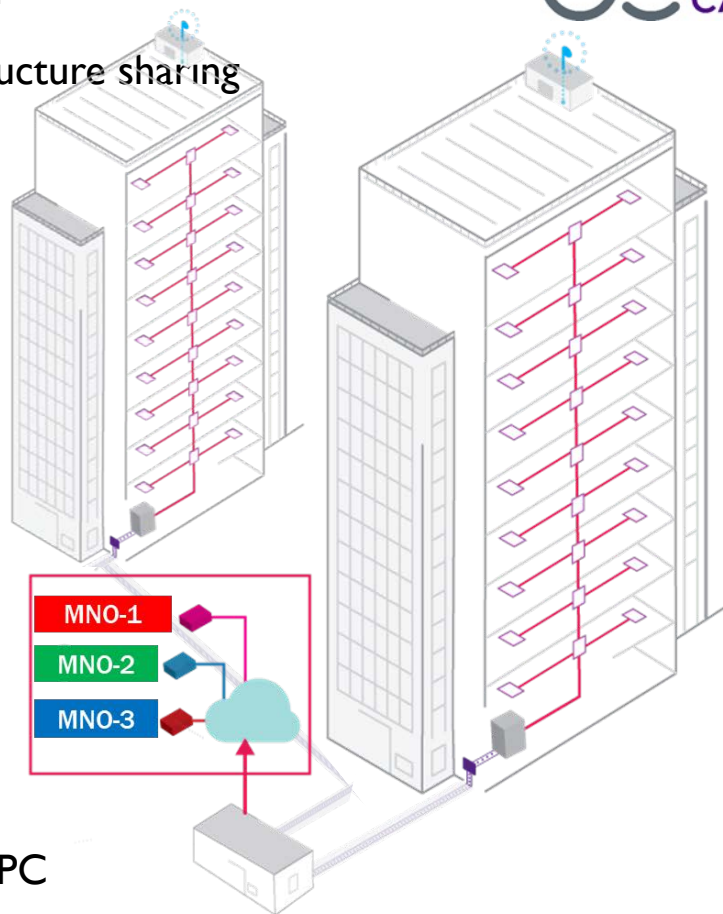


- Private multi-tenant LTE on CBRS
  - Use cases
    - Integration with building management system
    - Package delivery tracking within the building
    - Floor-by-floor occupancy data, indoor air quality, lobby occupancy and elevator wait times
- Performance and scalability
  - Local DU for security and performance
  - CU in Edge data centre to support multiple customers and for scalability
- Synergies with our customer-partner
  - IT network resources and expertise
  - Willing to share and test smart building tech
- Neutral host
  - Support for multiple carriers
  - Pre-installed indoor cable plant

# The neutral host platform

A CBRS network that maximises infrastructure sharing

- Shared Components
  - Wiring
  - Remote Radios/Antennas
  - MOCN function
  - Network Management
  - Servers to host Radio SW
  - Radio SW: DU/CU
  - Colocation Center
  - Transport from Building to Colo
- Not Shared
  - MNO EPC
  - Transit from Colo to each MNO EPC



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## Shared Components

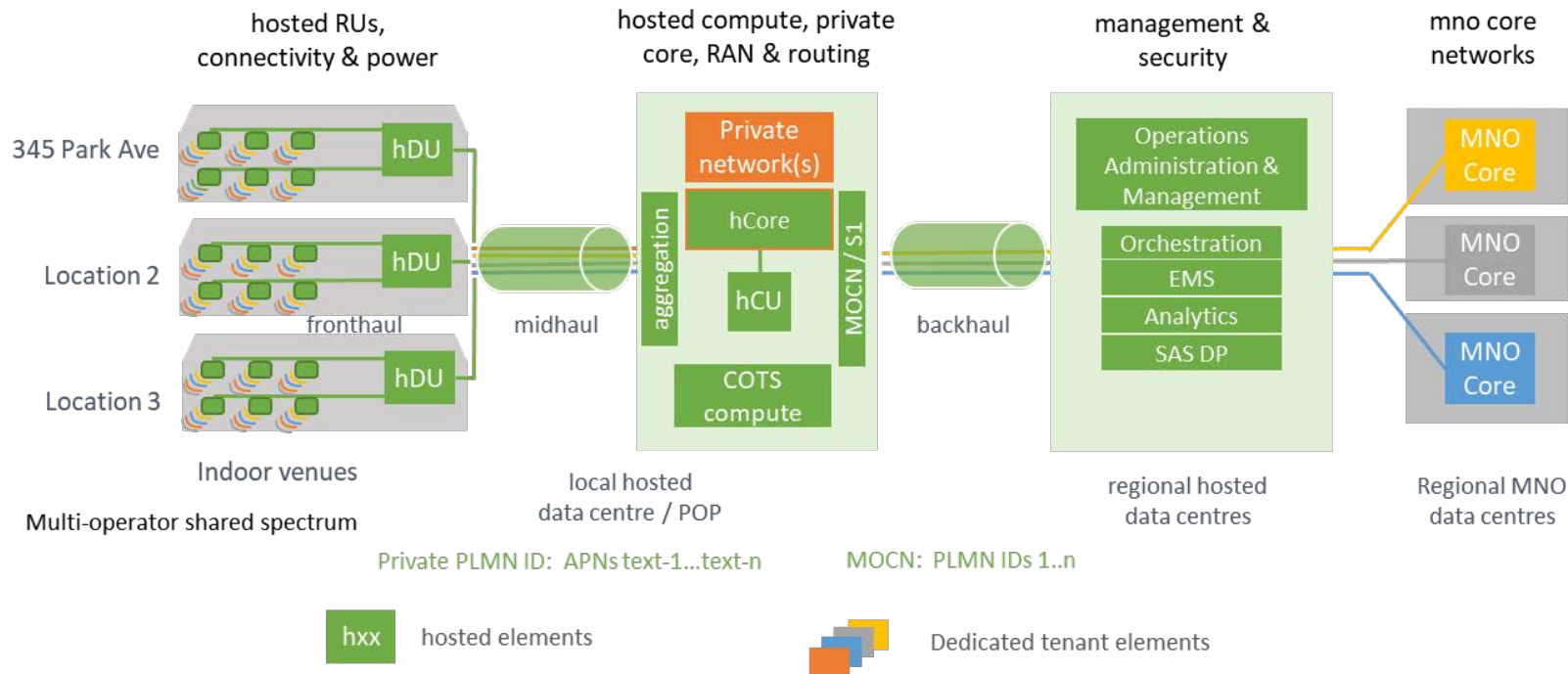
- Wiring
- Radios/Antenna
- Transport to Colo
- Colo Center
- Servers on & off Prem
- CU/DU SW
- Network Management

## Not Shared

- MNO EPC
- Transit Colo=> MNO



# The architecture



# Lessons learned



- Tenant approval affects the deployment timeline
- Building approvals for antenna mounting and other logistics
- Neutral Host-specific features that needed to be evolved
  - Capacity allocation
  - TAC coordination
- Provisioning interfaces and alarms

# More learnings

- Use APNs to route enterprise subscribers to different parts of the enterprise IP network
- Emergency services
  - Public operators manage emergency services
  - What about private networks?
    - Granularity in location information reporting
    - Regulations continue to evolve
- Laboratory testing proved to be valuable
  - During lab testing we were able to change configurations and validate requirements
  - Validation of operator connectivity without impacting commercial traffic

## In summary



- Deployed a private network that supports multiple enterprise tenants using the CBRS band
- This private network was built on a flexible architecture that allows for scalability
- Enabling neutral host support for multiple operators over the CBRS band
- Maximising use of shared small cell infrastructure for new use cases
- Being prepared to upgrade to 5G when our customers are ready
- The CBRS network at 345 Park Ave was designed with the infrastructure to meet future demands
- Fostering innovation for private enterprises and public mobile operators

# Questions

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# The architecture

A distributed architecture that provides **flexibility** and **scalability** for

- Shared Neutral Host
- Private solutions

